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A report of 49 cases of cnidarian envenoming from southeastern Brazilian coastal waters

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Abstract

Forty-nine accidents caused by jellyfish (Cnidaria) were observed during a period of 5 years on the southeastern coast of Brazil. Most of them involved male patients (65.3%), the injured areas being mainly the legs (71.3%) and the trunk (65.3%). Twenty accidents with *Chiropsalmus quadrumanus*, four with *Physalia physalis* and 20 with unidentified jellyfish presented intense pain, linear plaques and systemic symptoms. The five cases with *Olindias sambaquiensis* caused mild pain, round plaques and no systemic symptoms. There are a few reports on accidents caused by jellyfish, in this country, and scarce clinical or epidemiological data are available up to the present moment. © 2002 Elsevier Science Ltd. All rights reserved.

Keywords: Brazil; Jellyfish; Cnidarians; Stings; Venomous marine animals

1. Introduction

Accidents caused by jellyfish are common all around the world, with serious manifestations and occasional deaths reported in some countries (Burnett and Gable, 1989; Bengston et al., 1991; Fenner and Williamson, 1996; Williamson et al., 1996). The cnidarians are animals that present a complex intracellular secretory product, the cnida, the cnidocyte being the cell that synthesizes it, and from which it is discharged (Watson and Wood, 1988). The nematocyst, a type of cnida, in many cases is a cyst with a harpoon-like structure that injects a complex mixture of toxins, which are associated with neurological, cardiological and cutaneous repercussions, manifested by intense pain, cardiac arrhythmia, respiratory distress, sudoresis, nausea, vomiting and cutaneous erythema, besides a swelling and superficial necrosis at the points of contact with the tentacles (Burnett et al., 1986; Burnett and Calton, 1987). The venom provokes toxic and allergic effects, both of which are potential causes for severe accidents and deaths (Reed et al., 1984). Recently, Burnett et al. (1997) reviewed cnidarian venom research from 1991 to 1995.

There are four species of jellyfish associated with accidents in Brazil: the cubozoans *Tamoya haplonema* and *Chiropsalmus quadrumanus* (‘águas-vivas’ in the Portuguese language), whose tentacles may reach some meters in length, and are likely to be observed on most of the Brazilian coast and are responsible for both local and systemic signs and symptoms (Morandini and Marques, 1997; Haddad, 1999, 2000); the Portuguese man-of-war, *Physalia physalis* (‘caravela’ in the Portuguese language), a hydrozoan colony that can cause severe injuries to bathers and fishermen (Freitas et al., 1995; Haddad, 2000); and *Olindias sambaquiensis* (‘relojinho’ in the Portuguese language), a small sized

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Table 1
Jellyfish associated with the injuries and clinical aspects observed in the patients

	Accidents	Pain (+, mild; ++, intense)	Linear plaques	Round plaques	Systemic symptoms[a]
C. quadrumanus	08	++	+	−	08
C. quadrumanus (probable)	12	++	+	−	12
P. physalis	04	++	+	−	04
O. sambaquiensis	05	+	−	+	−
Unidentified (cubozoan?)	20	++	+	−	20

[a] Nausea, vomiting, respiratory distress, malaise.

hydrozoan medusa that provokes mild accidents on the Southeastern coast (Haddad, 2000).

A sequence of five cases of 'seabather's eruption', a cutaneous rash provoked by planula larvae of the scyphozoan *Linuche unguiculata* was reported in Brazil (Haddad et al., 2001), as well as an accident caused by *Nemalecium lighti*, a hydrozoan colony of polyps previously not associated with human injuries (Marques et al., 2002). There are many species of jellyfish that provoke accidents all over the world (Halstead, 1965; Williamson et al., 1996), some of them occurring along the Brazilian coast (Bouillon, 1999; Mianzan and Cornelius, 1999), but up to the present day they have not been with injuries in human beings.

2. Identification of jellyfish

For the identification of jellyfish species along the Brazilian coast useful sources are Bouillon (1999) (hydromedusae), Mianzan and Cornelius (1999) (cubo- and scyphomedusae) and Pugh (1999) (Siphonophora). Voucher specimens of these species are available in the collection of the Museu Nacional (= National Museum) da Universidade Federal do Rio de Janeiro (MNRJ).

The hazardous jellyfish species occurring in the Ubatuba area, are the same as those known along the Brazilian coast (Silveira and Morandini, 1998):

C. quadrumanus (F. Müller, 1859) (Vannucci, 1954; Marques et al., 1997) (MNRJ 184, 1026, 1220, 1358, 1359,

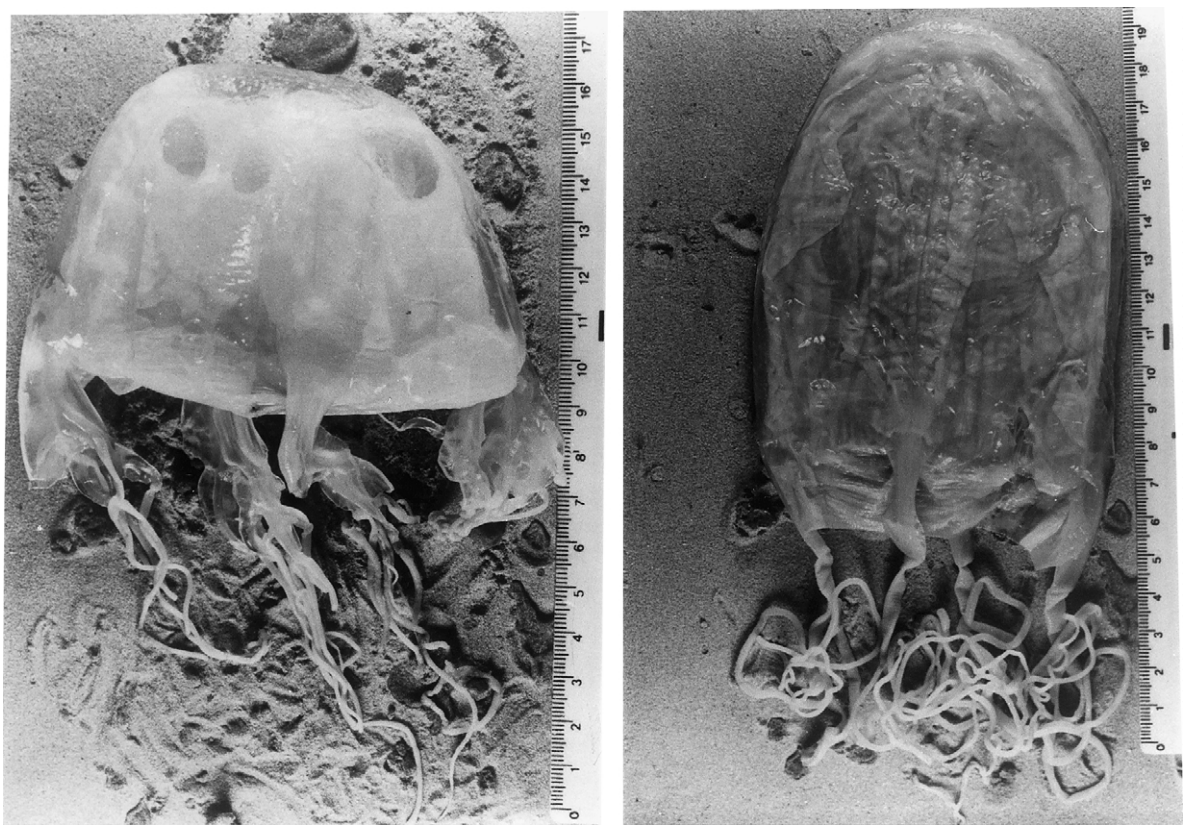

Fig. 1. *C. quadrumanus* (left) and *T. haplonema* (right), two cubozoans of the Atlantic coast.

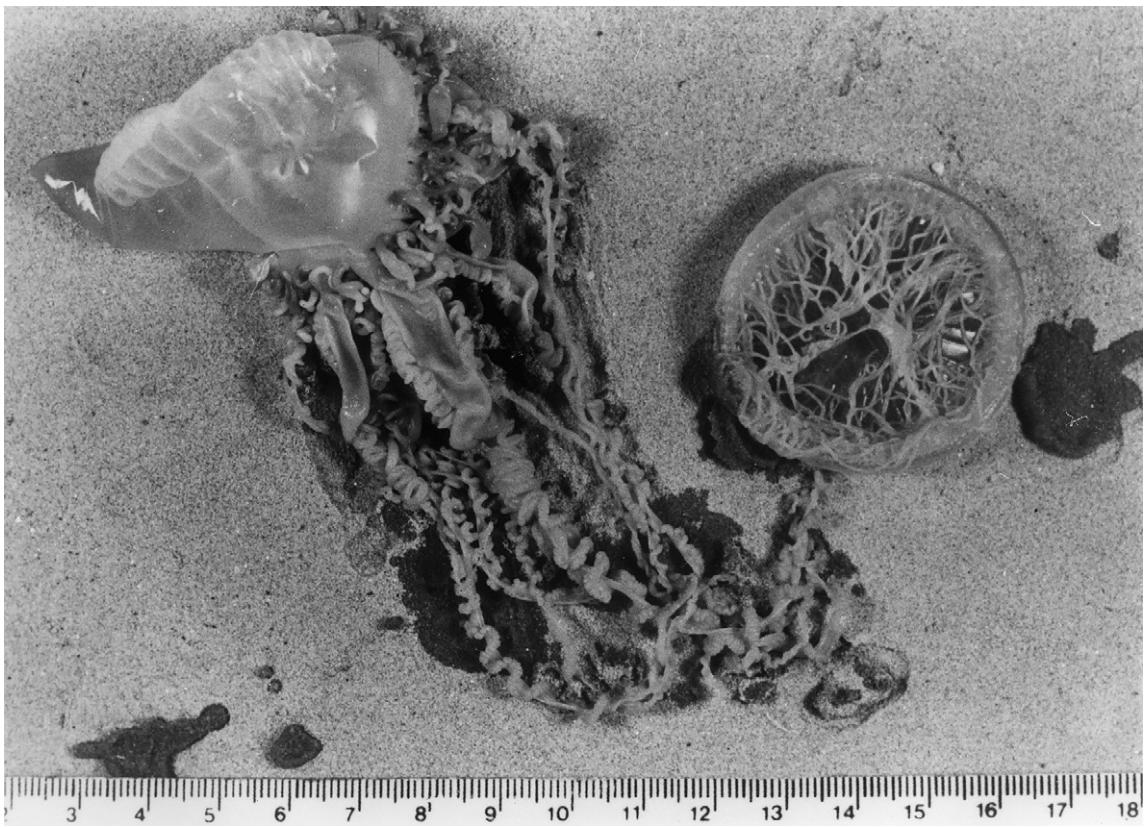

Fig. 2. *P. physalis*, the Portuguese man-of-war (left). This species is common in Brazil, mainly in the north and northeast coasts. *O. sambaquiensis*, being a hydrozoan medusa of the South Atlantic (right).

1360, 1671, 1685, 1686, 1797, 1935, 2213, 2214, 2231, 2232, 2233, 2234, 2235, 2263, 2264, 2265, 2266, 2267, 2268, 2964);

T. haplonema F. Müller, 1859 (Morandini and Marques, 1997) (MNRJ 3238, 4733);

O. sambaquiensis F. Müller, 1861 (Vannucci, 1951) (MNRJ 3239);

P. physalis Linnaeus, 1758 (Freitas et al., 1995) (MNRJ 820, 821, 824, 826, 828, 1533, 1850, 1940, 2526, 2702, 2707).

Color photographs of these species are available in Haddad (2000) and Dr Paul F.S. Cornelius is acknowledged for the identifications in this book.

3. Report on cases

Forty-nine accidents caused by jellyfish occurred at Ubatuba (45.073°W 23.437°S), São Paulo State, a town on the southeastern coast of Brazil. For the period of observations, from January 1997 to June 1998 (Haddad, 1999, 2000, p. 13), and January 1999 to June 2000 (unpublished data), 37 patients were examined and treated by the first author; the others were so in 2001 (unpublished data). The accidents occurred in outbreaks, with numbers gradually increasing in a few days, reaching a peak after 1 or 2 days. Observation periods were during the summer holiday season, at a resort area for beach goers. In the following months, there were only occasional reports on accidents, subsequent to the drop in tourism in the area. The clinical aspects of the accidents are summarized in Table 1. There was a predominance of males (32 patients or 65.3%), the legs (35 patients or 71.3%) and trunk (32 patients or 65.3%) being the more frequently injured body segments.

For the first period of observations, the jellyfish responsible for the accidents were rarely identified, but there were eight accidents caused by *C. quadrumanus*, four by *O. sambaquiensis* and four injuries by *P. physalis* (sighting of the blue or purple floater was characteristic of the presence of this species). The cubozoans are transparent animals, hanging in the water column, and their characterization at the time of the accident is difficult.

In the third series (January 2001), there was one outbreak of 12 injuries on two beaches, many specimens of the cubozoan *C. quadrumanus* being collected with fishing-nets in shallow waters, at the same place and period of the accidents.

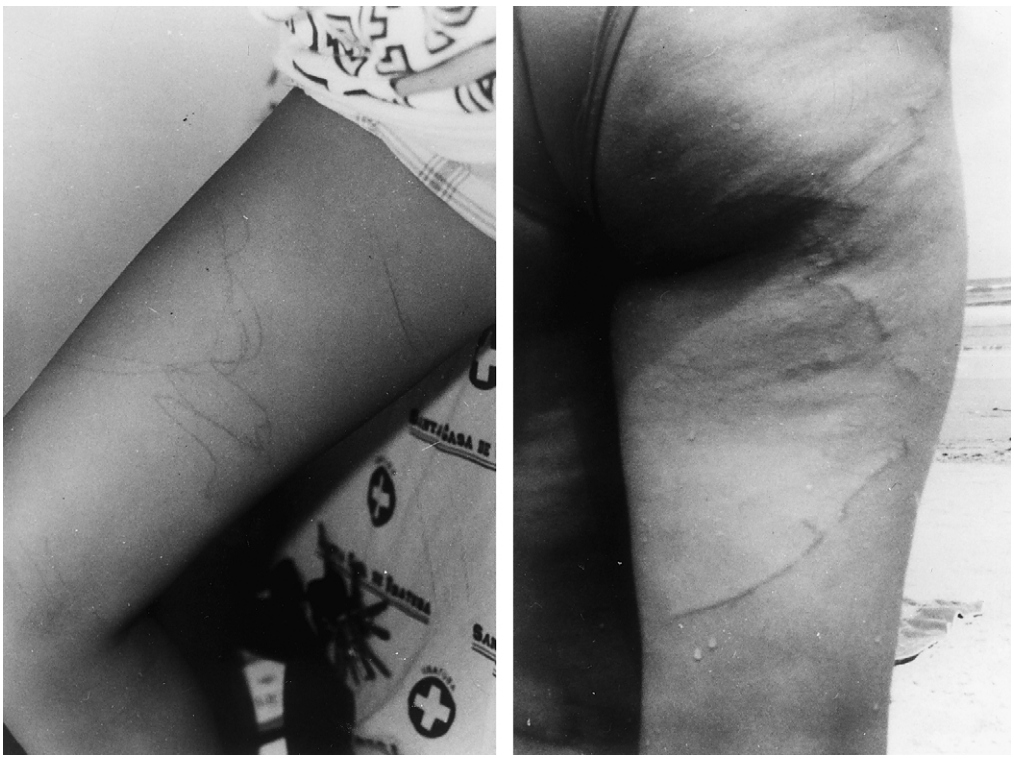

Fig. 3. A typical accident provoked by *C. quadrumanus* (left). Note the linear plaques and clinical similarity with the injuries caused by *P. physalis*, the Portuguese man-of-war (right). The linear plaques, intense pain and systemic manifestations are characteristic of both stings.

4. Discussion

Jellyfish accidents observed in Brazil can be distributed according to clinical aspects: 44 patients presented long linear erythematous plaques at the point of contact with the animal (one or more marks being up to 50 cm), this kind of lesion being representative of contact with long tentacles. Three species that caused injuries in the study area present tentacles over 1 m long: the cubozoans *T. haplonema* and *C. quadrumanus* (Fig. 1), and the hydrozoan *P. physalis* (Fig. 2).

The cubozoans were responsible for 20 accidents (eight were confirmed and associated with *C. quadrumanus* and 12 were patients of an outbreak that occurred on beaches where a large number of specimens of *C. quadrumanus* had been collected). The identification of clinical aspects such as long linear plaques (see Fig. 3), intense pain and systemic manifestations suggested that a further 20 patients were injured by cubozoans.

The accidents caused by *P. physalis* are also characterized by long linear plaques (Fig. 3), intense pain and systemic findings, but this species can be identified, since the bather can easily see the floater on the water. The Portuguese man-of-war caused four accidents; these accidents are not very frequent on the southeastern coast of Brazil. About 8 years ago, a heavy outbreak of accidents by *P. physalis* occurred at Guarujá (200 km south of Ubatuba) and nearly 300 stings occurred (pers. observ. and reports of Brazilian newspapers, e.g. Fernandes, 1994). This cnidarian is common in the north- and northeastern coasts of Brazil, appearing as stranded animals on the beaches, where it is associated with injuries of mild importance. Perhaps, the venom is rapidly inactivated or attenuated by heat, the closer the animals get to the beaches (Dr P.F.S. Cornelius pers. comm. 1997).

The hydrozoan *O. sambaquiensis* caused five injuries to bathers. Four patients collected the jellyfish for identification, this being an important fact, since the lesions presented clinical aspects that differed from the cubozoan and Portuguese man-of-war stings (Fig. 4). One victim presented the same clinical manifestations of the four confirmed accidents and was included in this group. This jellyfish has tentacles and there are reports of accidents manifested by short linear plaques and systemic manifestations (Kokelj et al., 1993) but the patients of this study manifested a different and typical pattern of signs and symptoms (erythematous and oedematous round marks measuring a few centimeters, with a mild pain). Three injuries presented piloerection on the round plaques. For further information on the life cycle, distribution, seasonal occurrence, appearance, stings, first-aid and medical management, see Mianzan and Ramírez (1996).

Fig. 4. A round mark and mild symptoms were indicative of contact with the hydrozoan *O. sambaquiensis*.

We think that there is a pattern of clinical identification of accidents caused by jellyfish on the Brazilian coast. The sighting of a blue or purple floater associated with long linear plaques, intense pain and systemic symptoms confirm an accident caused by *P. physalis*. Accidents without identification of the animals, absence of reports of floaters, the marks of long tentacles, intense pain, and important systemic manifestations should alert for the possibility of contact with cubozoans, mainly *C. quadrumanus*, since *T. haplonema* is rare in shallow beach waters. The presence of round marks or short linear plaques and mild symptoms is suggestive of contact with *O. sambaquiensis*.

The treatment of stings was done by the use of a cold compress of saltwater or cold packs, and the application of a vinegar compress (Exton et al., 1989). Pain faded away in about 1 h in nearly 40 patients, and nine received dipiron intramuscularly for total control of the pain. Systemic manifestations, when present, disappeared in nearly 1 h without treatment.

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References

Bengston, K., Nichols, M.M., Schnadig, V., Ellis, M.D., 1991. Sudden death in a child following jellyfish envenomation by *Chiropsalmus quadrumanus*: case report and autopsy findings. J. Am. Med. Acad. 266 (10), 1401–1406.

Bouillon, J., 1999. In: Boltovskoy, D., (Ed.), Hydromedusae, South Atlantic Zooplankton, vol. 1. Backhuys, Leiden, pp. 385–465.

Burnett, J.W., Calton, G.J., 1987. Venomous pelagic coelenterates: chemistry, toxicology, immunology and treatment of their stings. Toxicon 25 (6), 581–602.

Burnett, J.A., Gable, W.D., 1989. Fatal jellyfish envenomation by the Portuguese man-of-war. Toxicon 27, 823–824.

Burnett, J.W., Calton, G.J., Burnett, H.W., 1986. Jellyfish envenomation syndromes. J. Am. Acad. Dermatol. 14 (1), 100–106.

Burnett, J.W., Bloom, D., Imafuku, S., Houck, H., Vanucci, S., Aurelian, L., Kokelj, F., 1997. Recent advances in cnidarian venom research 1991–95; clinical, chemical and immunological aspects. In: Hartog, J.C.den, (Ed.), Proceedings of the Sixth International Conference on Coelenterate Biology, 1995, Leiden, pp. 77–84.

Exton, D.R., Fenner, P.J., Williamson, J.A., 1989. Cold packs: effective topical analgesia in the treatment of painful stings by *Physalia* and other jellyfish. Med. J. Aust. 151, 625–626.

Fenner, P.J., Williamson, J.A., 1996. World-wide deaths and severe envenomation from jellyfish stings. Med. J. Aust. 165, 658–661.

Fernandes, M., 1994. Caravelas afugentam os turistas no feriado. Folha de São Paulo, 25 Janeiro 1994, Supl. Cotidiano, pp. 3–4. [Portuguese man-of-war drive away tourists in the holiday. Folha de São Paulo newspaper, 25 January 1994, Supl. Cotidiano, pp. 3–4].

Freitas, J.C., Schiozer, W.A., Malpezzi, E.L.A., 1995. A case of envenomation by Portuguese man-of-war from the Brazilian coast. Toxicon 33 (7), 859–861.

Haddad Jr., V., 1999. Avaliação epidemiológica, clínica e terapêutica de acidentes provocados por animais peçonhentos marinhos na região sudeste do Brasil. [Epidemiologic, clinical and therapeutical evaluation of accidents provoked by venomous marine animals in Southeastern region of Brazil]. PhD Thesis. Escola Paulista de Medicina, UNIFESP, São Paulo.

Haddad Jr., V., 2000. Atlas de animais aquáticos perigosos do

Brasil: guia médico de identificação e tratamento. Editora Roca, São Paulo, pp. 10–24. [Atlas of dangerous aquatic animals of Brazil: a guide of diagnosis and treatment].

Haddad, V. Jr., Cardoso, J.L.C., Silveira, F.L., 2001. Seabather's eruption: report of five cases in Southeast region of Brazil. Rev. Inst. Med. Trop. S Paulo 43 (3), 171–172.

Halstead, B.W., 1965. Poisonous and Venomous Marine Animals, United States Government Printing Office, Washington, DC, pp. 297–536.

Kokelj, F., Mianzan, H., Avian, M., Burnett, J.W., 1993. Dermatitis due to *Olindias sambaquiensis*: a case report. Cutis 51, 339–342.

Marques, A.C., Morandini, A.C., Pinto, M.M., 1997. Cnidome of *Chiropsalmus quadrumanus* (Cnidaria, Cubozoa) from Brazil, Anals of VII Colacmar (Boletim de Resumos Expandidos VII Colacmar), vol. 2. Instituto Oceanográfico da Universidade de São Paulo, Santos, pp. 136–138.

Marques, A.C., Haddad, V. Jr., Migotto, A.E., 2002. Envenomation by a benthic Hydrozoa (Cnidaria): the case of *Nemalecium lighti* (Haleciidae). Toxicon 40 (2), 213–215.

Mianzan, H.W., Cornelius, P.F.S., 1999. In: Boltovskoy, D., (Ed.), Cubomedusae and Scyphomedusae, South Atlantic Zooplankton, vol. 1. Backhuys, Leiden, pp. 513–559.

Mianzan, H.W., Ramírez, F.C., 1996. *Olindias sambaquiensis* in South Atlantic. In: Willianson, J.A., Fenner, P.J., Burnett, J.W., Rifkin, J.F. (Eds.), Venomous and Poisonous Marine Animals: A Medical and Biological Handbook, University of New South Wales Press, Sydney, pp. 206–208.

Morandini, A.C., Marques, A.C., 1997. Morbakka Syndrome: First Report of Envenomation by Cubozoa in Brazil, Anals of VII Colacmar (Boletim de Resumos Expandidos VII Colacmar), vol. 2. Instituto Oceanográfico da Universidade de São Paulo, Santos, pp. 188–189.

Pugh, P.R., 1999. In: Boltovskoy, D., (Ed.), Siphonophorae, South Atlantic Zooplankton, vol. 1. Backhuys, Leiden, pp. 467–511.

Reed, M.K., Bronstein, B.R., Baden, H.P., 1984. Delayed and persistent cutaneous reactions to coelenterates. J. Am. Acad. Dermatol. 10 (3), 462–466.

da Silveira, F.L., Morandini, A.C., 1998. Água-viva ou mãe-d'água, ainda ilustre desconhecida do litoral do Brasil. Inform. CIRM 10 (2), 14.

Vannucci, M., 1951. Hydrozoa e Scyphozoa existentes no Instituto Paulista de Oceanografia. I. Bolm Inst. Oceanogr. 2 (1), 67–98.

Vannucci, M., 1954. Hydrozoa e Scyphozoa existentes no Instituto Oceanográfico. II. Bolm Inst. Oceanogr. 5 (1–2), 95–149.

Watson, G.N., Wood, R.L., 1988. Colloquium on terminology. In: Hessinger, D.A., Lenhoff, H.M. (Eds.), The Biology of Nematocysts, Academic Press, San Diego, pp. 21–23.

Williamson, J.A., Fenner, P.J., Burnett, J.W., Rifkin, J.F., 1996. Venomous and Poisonous Marine Animals: A Medical and Biological Handbook, University of New South Wales Press, Sydney, pp. 119–310.